AMERICAN
RAILROAD JOURNAL,
AND
ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT No. 30 WALL STREET, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K. MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, SEPTEMBER 23, 1837. (Published January 27, 1838) VOLUME VI.—No. 38.

CONTENTS.

Buffalo and Erie Railroad Report . . . 569
Principles and Practice of Levelling . . 571
Opening of the Railway from Paris to St. Germain 573
The Baltimore and Susquehannah Railroad.—The Cincinnati & Charleston & Louisville Railroad.—The Raft in Red River 574
Durability of various kinds of Wood . . . 575
Advertisements 576

AMERICAN RAILROAD JOURNAL.

NEW-YORK, JANUARY 27, 1838.

BUFFALO AND ERIE RAIL ROAD REPORT.

T. S Brown, Chief Engineer.

To the President and Directors of the Buffalo and Erie Railroad Company.

GENTLEMEN,—Having, in compliance with your instructions, completed the preliminary surveys of the Buffalo and Erie Railroad, together with the estimates based thereon, I have the honor to submit the following report.

I. *General description of the line.*

The Buffalo and Erie Railroad will extend from the western limits of the State of New-York, eastward, along the south shore of Lake Erie, to Buffalo; a distance of about 70 miles. At its western extremity, it will connect with a railroad, to be hereafter chartered by the State of Pennsylvania, leading to Erie, and thence to the line between Pennsylvania and Ohio. From the eastern boundary of Ohio, along the shore of Lake Erie, to the western extremity of the Lake, Railroad charters have already been granted, and at different points of the line, the construction of the road has been commenced. It is believed, also, that railroad charters already exist, and that surveys have been made, and even construction begun on a connected line of roads, extending westward from Lake Erie to the southern extremity of Lake Michigan, and thence, in the same direction, to the Mississippi river. At Buffalo, the eastern extremity of your road will connect with the continuous line of railroads, constructed, and to be constructed, leading from Buffalo to Albany, whence, by means of the western Railroad of Massachusetts, a communication will soon be opened with Boston. The Buffalo and Erie Railroad, is therefore, an important link in that grand chain of railroad communications, which, by the route along the Erie Canal and the shores of the Great Lakes, is to connect Boston with the Mississippi river, the extreme east, with the extreme west. This line is intersected at various points by important lateral branches which will serve to swell the amount of its business, and to dispense to all parts of the widely extended country through which they pass, the advantages of a cheap and rapid mode of intercourse. At Dunkirk, forty-two miles west of Buffalo, your road will connect with the western termination of the great New-York and Erie Railroad, which commencing at Tappan on the Hudson River, will proceed westward through the southern tier of Counties of the State of New-York, to Lake Erie. To that work, yours will be an important auxiliary, and from the connection between them, when completed, much profit cannot fail to accrue to your Stockholders.

Desisting from these general views, I will proceed to describe, more particularly, the route of the Buffalo and Erie Railroad.

Commencing at a point on the western boundary line of the State of New-York, within a few rods of Lake Erie, in the new village of Napoleon, the line proceeds in a northeasterly direction, inclining at first inland, for the purpose of avoiding the numerous ravines into which the surface is cut immediately adjoining the Lake shore. Having in a length of two miles, attained a distance from the shore of about one mile, the line for about six miles will run on extremely favorable ground, parallel to the shore, and below the ridge on which the postroad is constructed. Here it will again be necessary to converge towards the Lake for a distance of two miles, for the purpose of attaining a favorable point for crossing Chautaque Creek.

At Westfield, and for some distance below, the ravine formed by this creek is very wide and deep, but near the Lake in the village of Barcelona, (Portland Harbor,) a point for crossing is found, which though still requiring the construction of a bridge of considerable extent and cost, is the best which can be obtained.

Passing through the village of Barcelona on the line either of 8th or 6th street, the line will again diverge from the Lake, and crossing numerous ravines, will once more reach the smooth and favorable surface immediately below the ridge occupied by the main road. Running close under the foot of this ridge, the line passes about half a mile north of Centreville and Salem, and crosses Coney's creek and Slippery Rock Creek, at points where no difficulties are presented, though nearer the Lake, the ravines of both these creeks would offer very formidable obstacles. Soon after passing Salem, the line changes direction, and converging towards the Lake, crosses the ravine formed by the Little Canadaway Creek where it is 600 feet wide and twenty deep, the creek itself being only twenty or thirty feet wide, and one or two deep. Leaving Van Buren harbor about a mile to the north, and crossing the Canadaway Creek at a favorable point, the route will pass over some broken ground, and entering Dunkirk, will curve into the line of Third-street, down which it will proceed to its intersection with Lion-street. At this point, which is eighteen miles from Barcelona, or twenty-eight from the State Line, your road will intersect the New-York and Erie Railroad.

In running the experimental lines, all the Lake shore villages have been included in the route, except Van Buren. It was found on examination that the road could not be taken through this place without incurring considerable extra expense, by crossing the valleys of Coney's Creek, Slippery Rock Creek, and Little Canadaway Creek at unfavourable points, besides encountering numerous ravines, which the line, as actually run, avoids; or without approaching Van Buren from the westward, at a rate of descent much greater than has been found necessary on any other part of the road. East of this village the ground is very favorable. A knowledge of the positions and elevations of certain fixed points has led to these conclusions without the necessity, for the purpose of a preliminary survey, of actually running a line of levels through Van Buren. It will undoubtedly be for the interest of the Stockholders, that the road should pass through as many villages as possible, and particularly where the villages are situated at harbors on the Lake, but if future careful surveys should confirm what is rendered probable by the partial examinations already made, it will evidently be better that Van Buren should be connected with the main route by a short branch,

than that the road should be seriously injured by taking it there in opposition to the requirements of the ground and to true principles of location. The railroad already chartered, which is to connect Van Buren Harbor with Fredonia, will cross your road not far from half way between those places, and might very conveniently, serve as a branch leading to both.

Proceeding eastward from Dunkirk, the line will follow the course of 3d street for nearly a mile, and then bending more towards the Lake, and crossing several creeks and ravines over eight miles of surface, which is on the whole rather favorable, will pass just to the north of the residence of Oliver Lee, Esq., at Silver Creek, and will strike Silver Creek in the village of Fayette, at a point two or three hundred feet from its mouth. Leaving the creek, the line curves around Oak Hill which lies immediately to the east of it, upon the top, and near the brink of the precipitous rocky bluff forty feet high, which at that place forms the Lake shore.

The valley of Silver Creek, and Oak Hill beyond, present obstacles which appear somewhat formidable; but by passing the road over the valley at a considerable height, by means of a trestle bridge, the alternatives, of steep grades, or of deep cutting and heavy fiilling, are both avoided at a comparatively moderate expense.

Having cleared Oak Hill by means of two curves of 2500 feet radius, their curvatures being in opposite directions, the route continues on favorable ground to Irving, at the mouth of Cattaraugus Creek, three miles distant from the flats, adjacent to Cattaraugus Creek, are occasionally subject to be overflowed, but this evil will be much diminished when the United States works of improvement at the mouth of the harbor are completed, and a very moderate embankment will obviate all inconvenience from this cause.

Crossing Cattaraugus Creek at a point either immediately adjacent to the new bridge, or at a considerable distance above it, the line traverses the Cattaraugus Indian reservation, where it is only a mile and a half wide, and conforming with the direction of the Lake shore, will bend considerably to the north, for the purpose of keeping upon the favorable surface extending between the Lake and the high and broken ground occupied by the old Erie road. Four miles from the Cattaraugus, in the rear of Cash's tavern on the lake road, a ridge is encountered, running in a direction nearly perpendicular to the line, and terminating in a bluff upon the Lake, and immediately east of the ridge, follows the wide and deep valley of Mud Creek. In passing this ridge a cut will be necessary, which will extend about 2500 feet, with a mean depth of seven feet, and the grade line will pass over Mud Creek Valley for a distance of 900 feet, at a height above the surface of from fifteen to twenty-five feet. From Mud Creek to Big Sister Creek, crossing Delaware Creek, the line passes over very favorable ground. Bending around the point of high ground occupied by Mr. Taylor's farm at Big Sister Creek, the experimental lines of survey have crossed that creek within a few rods of the point where it is crossed by the old Erie road. From this place, which is eight miles from Cattaraugus Creek, or twenty miles from Dunkirk, and about a mile and a half from the lake shore, the line again turns inland, and proceeds in nearly a direct course over ground which is not unfavorable, except that it will require an ascending grade of twenty-five feet to a mile, to the point selected for crossing Eighteen Mile Creek, five miles distant. This crossing place is about two and a half miles from the Lake, and a short distance above the small village, at the mill owned by Mr. Burland. The whole course of the creek for about three and a half miles from the mouth, was carefully examined, and this point chosen as offering, on the whole, the fewest disadvantages. Here the chasm formed by the stream is about 400 feet wide, with precipitous rocky banks on each side, and the height of the grade line above the bottom of the ravine will be about ninety feet. This ravine is the most formidable obstacle which is encountered on the whole road It is proposed to pass it by means of a wooden bridge resting upon two piers, the abutments, and also the piers for a height of thirty feet, to be of masonry, and the upper part of the piers to consist of substantial frames of timber, capable of supporting securely the bridge and load. Progressing eastward, the grade line continues slightly to ascend for a distance of about two miles, when it reaches an elevation above the Lake of nearly 160 feet. To descend from this elevation by an easy slope on favorable ground, required for five miles numerous and careful examinations. In the end a line was determined, which converges considerably towards the Lake, and winding down along the northern slope of the high ground east of Eighteen Mile Creek, at a rate of descent not greater than it has been necessary to adopt on other parts of the road, proceeds in a direction on the whole remarkably straight, towards Buffalo. A point on this line four and a half miles east of the place of crossing Eighteen Mile Creek, is about one hundred feet above the Lake, and one mile distant from it. From this place, the line, continuing to descend over a very favorable surface, with the exception of a few deep and wide ravines by which the ground is furrowed, extends three and a half miles to a point about a mile east from Comstock's tavern, on the Lake road, and about three-fourths of a mile from the shore. In the vicinity of Comstock's, the Lake coast turns towards the north and west, nearly at right angles to its previous general direction, and the railroad route conforming to it, bends in a similar manner. From the point of this route last mentioned, one mile east of Comstock's, and about six miles from Buffalo, two routes have been surveyed leading into this city. One, running parallel to the shore soon enters the Buffalo swamp, and passing for the last three miles between the turnpike and the Lake, and but a few hundred feet from the water, crosses Buffalo Creek on the line of Ohio-street just above the present toll bridge, and proceeds down Ohio-street, towards its junction with Main-street. The other, keeping back from the Lake about one and a half miles, and upon the Indian land, will pass over the Buffalo swamp where it is not wide, and will cross Buffalo Creek one mile and three-fourths above the turnpike bridge. From this place the line follows the course of the Abbott road towards the city of Buffalo, and entering Elk-street, near the boundary line of the Indian reservation, may proceed down that street or any of the streets parallel to it towards Main-street. It will be for the directors to determine which of these routes shall be chosen for final location; and for the purpose of making this choice, careful estimates and statements of their comparative cost and advantages, will at a proper time, be presented. The route last mentioned, has on account of its cheapness, been selected for the estimate contained in the present report.

The foregoing general description applies to the route of the road as determined by the examinations which have actually been made; but it is important to remark that material modifications of it will undoubtedly be suggested by further surveys, particularly from Buffalo to Dunkirk; and it is not impossible that a line may be found, differing entirely from, and possessing advantages superior to the one now described.

In considering the profile of this road, the principal remark which it is important to make, is, that though it is to be constructed immediately adjacent to the waters of Lake Erie, it will have no resemblance to a road built in the valley of a river. The grade line far from being on the whole nearly level, is broken into a continual succession of ascents and descents. At the State Line, Portland harbor, Dunkirk, Cattaraugus creek, and Buffalo, the height of the road is only from 10 to 40 feet above the Lake; but between all those places there are one or more summits, varying in height from 100 to 160 feet. This undulating character of the road, results chiefly, from the necessity of approaching the Lake at certain points, for the purpose of attaining good places for crossing some of the streams, as at the State line, to secure a good location for crossing Twenty-Mile creek in the State of Pennsylvania, and at the mouths of Chautauque creek, Canadaway creek, Silver creek, and Cattaraugus creek; and of receding from the shore on other parts of the line, to avoid ravines, and ridges terminating at the edge of the water in abrupt rocky bluffs. As the face

of the country generally inclines towards the Lake at a considerable angle, the distance of the line from the shore cannot be varied, without causing a corresponding variation of level. It gives me pleasure, however, to inform you that the rise per mile will no where exceed twenty-five feet, and that there will not be any curves of less than 2500 feet radius. As the chief points for the receipt and delivery of freight coincide nearly with the Lake level, the ascents and descents between these points will be equalized. The greatest inclination upon your road being as before stated, only 25 feet per mile, on which slope it may be assumed that the gravitating force of the load will be nearly equalled by the friction, the loss of power resulting from the undulations in the grade line, will be much less than might be supposed. The load attached to a Locomotive Engine of given power, will necessarily be limited to that which the steepest grade on the line can be overcome; but in consequence of the compensating effect resulting from the action of gravity on the descending slopes, the measure of the mechanical effort necessary to transport this load from any point at the level of the Lake to any other point at the same level, will be no greater than if the road between were horizontal, and of equal length, except on account of the loss of power arising from the additional friction, produced by the action of the load upon the Engine on the ascents. Practically speaking, the variable action of the Engine will be productive of inconvenience; but this evil may to a considerable extent, be obviated by proper management on the part of the Engine man. Having these important principles in view, it has appeared to me proper to diminish the cost of the road by regulating the grade in short portions, so that it will conform nearly to the various slopes of the ground, always taking care, of course, to keep the inclination below the limit assigned above as the maximum. It has also been my object to keep the grade line, as much as possible, from one to two feet above the surface of the ground, with a view to the use of the road in the winter season, and on account of the wetness of soil; and hence, the estimates show a considerable excess of embankment over excavation. Great improvements in the adjustment of the grade lines will undoubtedly result from further examinations, but it is not probable that any route can be found which will be cheaper than the one I have described.

(To be completed in the next.)

From the London Railway Magazine.

PRINCIPLES AND PRACTICE OF LEVELLING.

BY THE EDITOR.

Simultaneous or Intermediate Levels.

Where the ground is irregular or much undulating within a short distance, levellers elude the trouble of several adjustments of the level, by fixing on a spot commanding a number of them at a moderate distance, on one side of the line to be levelled. In the ordinary way of fore and back observations, a little inaccuracy of the level, or in its adjustments, will not show itself, because on an average the distance of the fore and back observations are about equal, and therefore inaccuracies, or want of perfect adjustment, nearly balance each other; but in the cases of intermediate levels, it is much more needful that the instrument be a good one and truly adjusted.

It is also advisable that the instrument be set up as nearly as possible equi distant from the first and last positions, particularly, if they are any great distance from it.

The following plan of registering simultaneous levels is from the managing surveyor of a very eminent engineer. For fewness of entries, it is preferable to one we have been in the habit of following. But we think ours has the advantage in simplicity and detection of error. We shall describe both.

The first of a series of simultaneous levels this gentleman enters as a back sight, and all the rest, including the last, as fore sights. No intermediate back sights whatever are entered, as in the annexed specimen. The differences between these fore sights and the back sights, give their respective rises or falls. He, however, only reduces the first and last sight, and recommends all the intermediate one to be left to the last, "that the addition or subtractions of them may not be mixed up with the general running levels." He also advises their rises, falls, and reduced levels to be entered in red ink, which will always mark their character; or he otherwise puts a mark against the last fore sight, as for instance, against 1·50 and 4·52 in the following specimen. To find the reduced levels of these intermediate points their rises and falls are separately referred to the former principal reduced level. For example, in the following field-book, we start at an elevation above some point of 240 feet; and therefore 3·35, 1·85, 2·20 are severally added to, and 4·60 subtracted from 240·00 to obtain their respective reduced levels. In the same way 2·80, 4·00, 1·00 are also separately added to, and 2·80 subtracted from 244·50 to have their corresponding reduced levels.

Back Sights.	*Fore Sights.*	*Rise.*	*Fall.*	*Red'd Levels.*	*Dist.*	*Observations.*
Back Sight on Canal.				*Feet.*	*Ch Lk.*	
				+240 00		On Surface of Canal.
6·00	2·65	3·35	....	243·35	4·50	
	4·15	1·85	....	241·85	.....	At cor. of hedge on right.
	3·80	2·20	....	242·20	.....	20 lks. from house on left.
	10 60	....	4·60	235·40	7·10	In Hollow.
	1·50 ×	4·50	....	244·50	9 00	On Brow of Bank.
9·20	6·40	2·80	....	247·30	12·00	On Line.
	12·00	....	2.80	241·70	13·00	Ditto.
	4·60	4·60	....	249·10	.....	To rt. of last dist. 200 lks.
	8 20	1 00	....	245·50	.....	To left ditto 150 links.
	4·52 ×	4·68	....	249·18	17·50	On line (at cor. of fence.)

By the same method, which is very simple and economical, all the intermediate reduced levels are separate independent reductions, and no succeeding reduced level will afford any test of the truth of the preceding. It is true the operations are very simple and easily gone over again; but always in figures it is considered an object, where errors are so likely to creep in, to make, if possible, the last computation a proof of the accuracy of all the preceding. This is our plan, which is done by entering each of the intermediate sights a fore sight to that one which precedes it, and a back to the one which follows it. We then proceed precisely as in the case of ordinary running sights. Thus we should make 2·65, 4·15, 3·80, 10·60 respectively back observations to 4·15, 3·80, 10·60, 1·50; and so likewise 6·40, 12·00, 4·60, 8 20, respectively back observations to 12·00, 4·60, 8·20, 4·52. In the addition of verification, however, these intermediates would have the pen drawn across them, and be left out. So that we should leave no more figures to add up than the preceding method, while the reduced levels would all be dependent, and betray at the end any error in the previous parts.

We may also save labour in using the rising and falls as verifications, by striking out all but those which stand opposite to the last of the fore observations. By this means our addition in the columns of "rise" and "fall" is reduced to the same as the preceding method. We have described the two, leaving it to our readers to use whichever they prefer. As we said above, we admit the former to be more economical in entries, but we think the latter more uniform and secure against the existence of error.

Cross Sections.

Whenever the country is to be instrumentally examined for a line of railway, it is usual, when carrying on the operations of levelling to take a number of cross sections at various points, connecting them all with the main system of levels, so as to be referable to one common datum line. Some engineers having settled in their own mind nearly the

line they intend to follow, simply direct cross sections here and there to be made for short distances, with a view of seeing where and how any little deviation can be made to advantage. Others procure the best maps they can of the country, and order all the roads, lanes, and paths, if laid down, to be levelled for miles round, and the levels of the principal points to be marked on the maps. By this means, they get a pretty correct representation of the face of the country. Others, again, direct a system of reticulated levellings carried through the lowest parts of valleys and the highest ridges of hills, which they also carefully lay down on a map. This is the best possible method next to modelling a country; for the most advantageous line can afterwards be determined in the closet to the greatest nicety, and better than it could in the field.

Where the surface of a country is very irregular, it is not merely cross sections to the principal line of levels that are taken, but cross sections to the cross sections themselves, even to the third, fourth, and higher degrees. In all these cases it will be the best, and in the end the least expensive, as it will be the most correct way, to make a survey of the country first, unless good maps can be obtained, and enter on the plan itself the levels. But these are matters that do not belong to observations on levelling strictly speaking. I merely mention the matter to show young engineers the immense labour that is required for settling the best line between two given points, when the ground is troublesome. Upwards of 1,000 miles, I am informed, were levelled before the line of the Midland Counties was finally fixed on.

Levelling with the Theodolite.—General Description of the Theodolite.

It would take up too much room for us to go into a full description of this very useful instrument. We must therefore refer our readers for details to a neat little work on the "Principal Mathematical Instruments used in Surveying, Levelling," &c., by F. W. Simms. We may observe generally, that the object of a theodolite is to measure vertical and horizontal angles. For this purpose it is constructed on two brass, circular, horizontal plates, chamfered off at the edges, easily sliding on each other, and round a common axis. The circumference of the lower plate is divided into 360 degrees and half degrees, and sometimes into quarter degrees, or less. On the upper is one, and occasionally two or three, noniuses, for the purpose of subdividing the divisions on the lower plate into minutes or less of a degree. With these plates the horizontal angles are measured; the upper one generally carries two small levels at right angles to each other. The telescope has a spirit level attached to it, and is mounted in Ys, as in the common level; but these Ys are fixed to an axis supported on two upright arms on the upper plate, and to a portion of a graduated circle beneath them. A vertical motion is thus given to the telescope, and the graduated circle slides close to a fixed nonius, by which its divisions are subdivided into minutes or less. For moving the instrument very accurately, and by very small quantities, there are various clamps and tangent screws, or rack work to which it is unnecessary more particularly to advert.

On the other side of the graduated arc, there usually is a series of divisions marked "*difference of base and hypothenuse;*" and another marked "*perpendicular in* 100 *of base.*" According to the angle of elevation or depression, the former shows how many the base is of the same denomination less than the hypothenuse, supposed 100, whether it be chains, links, feet, &c. The latter also shows how many of the same denomination the perpendicular is, the base being 100.

We might here observe, that as there is no instrument more useful than the theodolite, so there is none that has been made in a greater variety of shapes and forms, which has arisen from the numerous attempts to improve it.

Rectification and Adjustments.

The first adjustment is to fix the crossing of the wires in the optic axis of the telescope, which is described p. 66 of the last number.

The second is that of determining the error of the vertical reading vernier, or of ascertaining the position of the telescope when its axis is parallel to the plane of the plates. Turn the upper plate round until each of the levels on it is parallel, or nearly so, to a pair of the adjusting screws beneath, like those in the level. Then by aid of these screws, and guided by the said levels, set the plate as correctly as possible level. Turn the intersection of the cross wires now to a particular part of some distant object, and read off the apparent elevation or depression of it on the part of the vertical circle by aid of the nonius. Take the telescope out of the Ys (previously thrown open for fear of disturbance,) and reverse it. Then turn the upper plate half way round, and point the intersection of the cross wires again to the beforementioned particular part of the distant object. The reading of its apparent elevation or depression will now be on the contrary side of zero on the vertical arc. If the two readings are the same, the nonius is correct; if not one-half the difference from the limb zero towards that side on which the greater reading was, is the true position of the zero. In all vertical angles, therefore, this half difference must be added to readings on the opposite side of the limb zero, and subtracted from those on the same side as the true zero is.

Third Adjustment.—Having set the plates level, and brought the true zero of the limb just found to the zero on the vernier, the axis of the principal level, that attached to the telescope, may be set very nearly parallel to the line of collimation of the telescope, by simply turning the screw at one end of it until its bubble settles in the middle. But the accurate adjustment must be made and proved as described in pp. 66 and 67, No. 18.

Fourth Adjustment.—The preceding adjustments enable us to set the axes of the telescope and level parallel to each other, and to a line in the plane of the plate under the telescope. The next and last adjustment we shall notice is that of making the vertical plane in which the telescope moves, truly perpendicular to the plane of its horizontal motion. Ordinary levels have no adjustment of this sort provided: the instrument is supposed to be turned out true in this respect from the hands of the maker. In very fine theodolites the frame carrying the pillars which support the axis round which the Ys turn, is fastened by three screws to the upper plate. With these the adjustment is easily made. When the adjustment is perfect, and the plane of the plates is set truly horizontal, if the intersection of the wires be turned on some well-defined elevated object—the more in reason the elevation the better—and then without moving the instrument the telescope be turned on the horizontal axis, until the said intersection fall on the reflected image of the body in any good liquid, as mercury, it will cut it in precisely the same point. If the intersection passes to the right or the left of the point, the adjustment is not complete, and must be altered.

Practice of Levelling with the Theodolite.

Though of much greater power and capability than the ordinary level, the theodolite is not so much used in practical levelling. This arises partly from its greater expense, partly from its more complex construction and liability to get out of order, and partly from its greater weight and inconvenience.

When the theodolite is substituted for the common spirit level, the point of true zero is brought to the zero on the nonius and clamped to it, after which the operations are precisely the same. But the method peculiar to the theodolite, and that in which it has a decided advantage over other instruments, consists in finding from a single sight the difference of level of any two places within view of each other, whose direct distance is given or can be measured.

For this purpose the theodolite is set up at one end of the stations, and the height of the centre of the level is measured by taking a mean, if the ground inclines much, of the heights of the eye and object ends of the telescope, when turned in the direction to be levelled. Perhaps this mean is best obtained by holding the two staves, one before and the other behind the telescope, with the vanes at the same height on each, and near the guessed height of the telescope,

when by inclining it parallel to the vanes, it mean height is immediately seen. The wire crossing the middle of the vane being set to this height, the staff is carried to the other station, and the apparent angle of elevation or depression read off, allowing for the index error, or quantity, the true zero of the arc differs from that marked on it, as before directed.

For the purpose of insuring accuracy, it is best to repeat the operation by reversing the positions of the instrument and staff, taking care to have the vane reset to the true height of the telescope in its new position. The mean of the angles of elevation and depression will be the true angle in either case. By this means any error in the parallelism of the telescope and level, or of the position of the true zero, will be corrected.

To the log-sine of this angle, add the log of the direct distance between the staves in feet, if the difference of level is wanted in feet, and the sum, minus 10 from the index, will be the log of the instrumental difference of levels. Correct this for sphericity and refraction in the way described p. 69, No. 18, and the result will be the true difference of levels.

If an arithmetical operation is wanted, take out the number cut by the bevelled edge of the fixed nonius marked "diff. of hypo. and base," which take from 100. Take out in like manner the number cut by the same bevelled edge of the nonius mark "perp. to 100 of base," and multiply the foregoing remainder by a 10,000th part of the product of the hypothenuse, and the number last taken out; the product will bethe instrumental difference of levels in the denomination of the hypothenuse, which must be corrected as before.

This is a very easy and correct mode when the angles of depression and inclination are such that the divisions exactly coincide with the bevelled edge of the nonius; otherwise it is a mere approximation.

Example.—The vane being adjusted to the height of the level and set up fourteen chains, or 294 feet off, the angle of depression was found to be 1° 9′ and the division corresponding to "perp. in 100 of base" was very exactly 2, that corresponding to "diff. of hypo. and base," not being any thing.

Here, then, we have the base sensibly the same as the hopothenuse, and consequently $\frac{1}{100}$th of 924, or 9·24, multiplied by 2 gives 18·48 feet, the fall sought. By previous levelling with the common spirit level it was found to be 18·64.

Secondly, If to 8·30255 log-sine of 1°9′ we add 2.96567 the log of 924, we shall have 11·26822, and taking away 10 from the index 11, leaves 1.26822 the log of 18·55 feet, very nearly the same as before, and as it was found by levelling; or thus:—

1°9′ log sin	8·30255
924 log	2,96567
18·55 log	1·26822.

When the theodolite is used for levelling in this way, the field-book contains a column for the angles of elevation and depression, distinguished with an *e* and *d*, or the characters + and — before them; a column for the Hypothenuse lengths; three for the rises, falls, and reduced levels, and another for the base lengths.

Angle of Elevation or Depression.	Hypothenuses.	Rise	Fall.	Reduced Level.	Bases.
° ′	Chains.	Chains.	Chains.	Chains.	Chains.
2 52 *d*	12·73	. . .	·6365	— ·6365	12·71
4 1 *e*	6 29	·4403	. . .	— ·1962	6·27
8 3 *e*	7 34	1·0276	. . .	+ ·8314	7·27
17 28 *d*	11·71	. . .	3·5130	— 2·6816	11·17

The sum of all the bases (here 37·42) is the total base or horizontal length. We have here given the rises, falls, and reduced level to four decimal places, because being given in chains it is needful, if accuracy is required.

In most practical cases I doubt whether it is not quite as short and convenient a process for finding the rises and falls, to take from a table of natural sines the sine of the angle and multiply the hypothenuse by it, according to the rule of contracted multiplication of decimals, as it is to turn out the logarithms, unless the object is to reduce it to any other measure. And the same with respect to finding the bases, which are the products of the cosines of the said angles by the hypothenuses.

We have not made any allowance for sphericity and refraction in the above observations, because in the greatest distance (840 feet) it is hardly worth notice, and our chief object was to elucidate the method rather than to run into minutiæ. In our future observations these details may form a subject for discussion.

OPENING OF THE RAILWAY FROM PARIS TO ST. GERMAIN.

We extract the following amusing account of this event, from the letter of the *Times* correspondent.

St. Germain, Aug. 26.

Paris has put on her seven-leagued boots, and reached St. Germain in a stride! The chateau of Louis le Grand, and the fine terrace sweeping through the forest until it is lost in distance, have kindly consented to approach the metropolis for the gratification of the numerous *quidnuncs* who inhabit it; and St. Germain, with all its interesting scenery, although, if we are to credit the map, it is twelve good English miles from Paris, is now more accessible than the windmills of Montmartre. This *triomphe merveilleuse*, as the Parisians delight to call it, is the work of that grand miracle-monger of the nineteenth century—steam; a trip on the railway is now the "*plaisir inconnu*," the "*emotion sauségal*;" and if there be throughout the length and breadth of Paris a single café or coterie, or in the faubourgs a "Merchand de Vin," *alias* "dramshop," where the praises of railroads in general, and of the railway to St. Germain in particular, has not formed the inexhaustible topic of conversation for the last four and twenty hours, I will suffer myself to be impaled alive like a frog in a gourmand's clutches, and fricaseed without mercy. * * *

The train started at twelve to the instant, and then was the clatter of voices raised tenfold. "*Il part—ce coursier de feu, et de fumée!* He snorts! he snorts! His prodigious tail of vapour floats in the firmament! *La viola!*" Even when the engine had attained its extreme velocity, the rattling of tongues was continued, one person shouting into a second's ear, and a third shrieking at the extreme pitch of his voice, "*Cheval magnifique!* Noble and intrepid horse, which nothing can stop! He devours the way before him—he snorts! *vraiment*, he snorts! He is clothed with thunder, like the horse of Job! *Corbleu!* what a delicious motion *—n'est-ce pas? Oui—c'est le plus grand plaisir du monde!*" Away clattered engines and voices to the same tune, to the end of the journey. If you wish for a genuine spceimen of an enthusiast, you have only to clap a Parisian for the first time in his life in a flying "locomotive." In the carriage in which I fixed myself were some half dozen piquantly-dressed soubrettes and grisettes, distinguishable by the extreme neatness of their *fichus de dentelles a la paysanne*, and their mignonnes lace caps. Of these no fewer than three affected dizziness, faintness, &c., and finished *par s'etre évanouies* on the bosoms of the gallants by whom they were accompanied Altogether it was a most precious living comedy, worthy of a place in Paul de Kock's "*Tourlourou sur les mœurs Parisiennes.*" Until I reached Paris, I laboured, in common with most people, under the absurd misconception, that the true "land of Cockaigne" is London. For genuine Cockneys you must come to France.

An hour's walk in the forest of St. Germain, after my arrival, was positively delightful in the extreme. In no direction could you turn without meeting elegantly-dressed Parisian ladies (and all other dressing is out of the question) moving along as gracefully as swans in the Cydnus, to which their white muslin dresses, which are very much the rage here, in no small degree assimilated them. What charming bonnets adorned with waving feathers, or with those ambitious, but not less elegant, wreaths of flowers, which are only made to perfection here, and exhibit the very acme of taste! And

then the eye is so pleasingly relieved by the graceful contrast presented by an unbonnetted girl, wearing one of those exquisite little caps; or by the outlandish helmet-shaped casquette which some rustic belle delights to select for her coiffure. The Bois de Boulogne never presented a more animated scene.

For statistics, it will be sufficient to state, that the *materiel* is composed of 105 vehicles, capable of containing 4,070 persons, and of transporting the entire population of Paris to St. Germain in the course of one fine Sunday. The railway, 4½ leagues in length, passes through a beautiful country, traversing no fewer than eighteen bridges, three of which are across the Seine. The vehicles are all intended for the transport of passengers, and will be occupied principally on Sundays. There is a tunnel Batignolles, which is divided into two galleries, being about 400 metres, or a quarter of an English mile long. The construction is very solid, the rails being fifteen times heavier than those upon the Liverpool and Manchester road.

(From the Baltimore Gazette, Friday, Jan. 19.)

THE BALTIMORE AND SUSQUEHANNA RAILROAD.

The progress of this road towards completion, is very properly exciting the deep interest and attention of the citizens of Baltimore—and certainly in proportion to its extent and cost, it will be, in usefulness and importance, scarcely second in value to any work of improvement connected with our city. Its progress has been urged on with a steady and persevering energy, which is highly creditable to the officers of the company to whose care and direction it has been entrusted. Within the last two years, the graduation has been nearly completed of that portion of the road which extends from Timonium (eleven miles from Baltimore,) to York in Pennsylvania, a distance of forty-six miles, through a broken country abounding in rocky hills and rapid streams, requiring in its whole extent the construction of numerous, and some of them extensive bridges, and a tunnel more than eighty yards in length; and an immense quantity of rocky and other excavations and embankments. The railway is constructed about two-thirds of the distance between Timonium and York. The rails are of rolled iron weighing nearly sixty pounds to the yard; they rest on wooden sleepers which are laid across the track, and imbedded in stone. The great weight and strength of the rails, and the firm manner in which they are attached to the sleepers, render the construction of the track of railway safe and permanent, and such as will require no repairs for many years, and at any time only such as can be effected with ease and at a small expense.

A continuous track of twenty-seven miles towards York, being completed of the new rails, and fit for use, the President and Directors of the Susquehanna Railroad Company invited several members of the Legislature now in this city, the Mayor and members of both branches of the City Council, and other City Officers, the Presidents, Directors, and Engineers of the other Railroad Companies in this city, to meet them yesterday morning at their depot at the head of North street, and proceed thence on an excursion over the railway as far as completed; and, agreeably to the invitation, a party of nearly two hundred assembled at the appointed time. The following account of the excursion, we copy from the American of this day:—

The party was conveyed the first 11 miles, to Timonium, by horse power. This part of the road is to be renewed with heavy rails, and various highly judicious alterations of the present location have been made, so as to make it conform in all respects with the new portions of the work.

From Timonium the company proceeded in new and elegant cars, the foremost train being drawn by the "Susquehanna," a very splendid new engine constructed at Lowell, Mass., on the English principle, with improvements by G. W. Whistler, Esq., civil engineer.—The second train was drawn by the "Herald."

The admiration of the party was excited as they advanced, as well by the romantic and abrupt character of the country through which they were travelling, as by the manner in which the able engineer, Isaac Trimble, Esq., had made his location, so as to present the most direct and permanent line of road. The succession of rocky ridgees cut through, and lofty embankments filling up the intervening valleys, indicated the extremely difficult character of the work, and gave rise to general wonder that so much could have been effected in so short a time, and with such evident durability. We understand, that notwithstanding the extraordinary difficulties overcome, and the permanent mode in which the rails are laid, the road has cost less per mile than most other great roads to the North, where the edge rail is used.

At noon precisely the foremost train crossed the Pennsylvania line, and a short time after attained the summit level, at an elevation of 850 feet above tide. On arriving at Hise's Mill, (in the neighbourhood of Strasburg, and 16½ miles from York) it was ascertained that that the "Susquehanna) had performed the trip of 28 miles in 1 hour and 31 minutes, exclusive of 11 minutes for stoppages, being an average speed of 18½ miles per hour.

In approaching the summit level, there are two miles, the grade of which is a rise of 84 feet to the mile, over which the "Susquehanna" passed in seven minutes, drawing two heavy cars with 140 passengers, besides the tender, &c.

An excellent dinner and appliances were duly discussed, and in returning the "Susquehanna" reached Timonium in 1 hour 16 minutes, having consumed in running the 56 miles, only one cord and a half of pine wood.

This road is steadily advancing towards completion, and will be among the very best constructed works in the country. The period, we are rejoiced to find, is near at hand, when our city will begin to realise its important advantages, in the results of the easy and rapid communication which it will open to the fertile and productive valley of the Susquehanna.

THE CINCINNATTI AND CHARLESTON AND LOUISVILLE RAILROAD.

Col. B. B. Long has arrived at Charleston, on a mission from Shauneetown, Illinois, to urge the importance of extending the Charleston and Cincinnatti Railroad to some point on the Ohio at or near the junction of that river with the Wabash. This would make then a continuous route with the railroad through Illinois to Alton, opposite the mouth of the Missouri, commanding thus much of the great produce trade north that would otherwise pass down the river. General Hayne communicated to Col. Long the following valuable information of the great project which now interests all the South and West.

"That the Louisville, Cincinnati and Charleston Railroad Company has a charter from the states of North and South Carolina, Tennessee and Kentucky, for the purpose of forming a connexion by a Railroad, between Charlestown and the Ohio River, through those states. The original charter provided that this Road should strike the Ohio at three points, viz. Cincinnati, Louisville, and Maysville. This has been so amended, however, as not to require the Road to be carried farther than Lexington—leaving it to those who are specially interested in these several branches, to unite them with our Road, at Lexington. The Company confidently relies on the combined efforts of all the states granting the charters, for the construction of the Road. South Carolina is prepared to do her part, but it will require the aid of North Carolina and Tennessee to enable her to extend the Road to Knoxville—and of Kentucky to continue it to Lexington. When our Road shall reach Knoxville, it may be, and doubtless will be, extended to Nashville, and eventually to the Mississippi, in that direction.—Tennessee has already caused surveys to be made for a Railroad from Fulton, on the Mississippi, to Knoxville, where our Road will unite with it. A Railroad from Nashville to Evansville, in Indiana, is also in contemplation, from which a very short branch would strike the Mississippi opposite Shawneetown.

THE RAFT IN RED RIVER.

The obstruction originally occupied a space of upwards of two hundred

miles; and, there is sufficient evidence that it has existed for ages before the discovery of the country, while its banks exhibit indubitable proof, that it once extended not within fifty miles of the confluence of that river with the Mississippi. The annual increasement has been estimated at two miles; and once formed, the serpenttine course of the stream forbids all possibility of removal, except by artificial measures, or the slow process of decay. In some places the raft is condensed to an astonishing depth, and forms what is called "the sunken raft:" a single strong log removed will sometimes liberate hundreds The raft region may now be considered under three divisions; that from which the raft is entirely removed, extending 140 miles from the commencement; that in which the raft is cut up and pulled in pieces, and not floated off—for which nothing is wanted but a strong current, which must immediately take place—33 miles ni extent; and that, lastly, which has not yet been commenced The water expelled from the channel by the raft into the lakes, parallel to the banks as the obstruction is removed, turns and deepens the bed of the stream. At the commencement of the raft there is little or no current. This has added much to the labour in removing the obstruction; and many of the logs removed, have floated back subsequently by a rise in the Mississippi. The removal now of a few yards of solid raft, causes a fall of eighteen inches above it, and a rise of six feet below. There remains only about four miles of the raft to be removed, and, when the channel is once clear, the current will be powerful and deep, and the banks on either side will be lofty and firm. Capt. Shrieve declares, that all can be accomplished in *three months*, after a suitable appropriation from Congress is made.

The magnitude of this undertaking, and the results which must ensue from its accomplishment, cannot be too highly appreciated. The river is navigable for more than 2000 miles above the raft, and through a region unrivalled in fertility. Though now thinly settled, it is rapidly populating—hundreds await the removal of the raft as a signal for entering the country—and all its vast resources and natural wealth must soon be developed. The result of this undertaking, once involved in doubt, as well as the permanent advantages which must ensue, are no longer problematical. The indefatigable industry, the untiring enterprise—the indomitable perseverance, and the enlarged and truly scientific designs of Captain M. Shrieve, the projector and accomplisher of this noble national work, can never be estimated beyond their merits His history is identified with that of the empire of the West; and his fame will endure so loug as the magnificent streams with which his name is associated, shall continue to roll on their volumed waters to the deep.—*St. Louis Bulletin.*

The annexed Table, showing the comparative durability of various kinds of timber, unprepared and exposed under the most trying circumstances, will be found of constant use for reference.

We should like to ascertain the state of the timber in some of our oldest Railroads. Accurate statements are solicited from those who can afford them.

DURABILITY OF VARIOUS KINDS OF WOOD.

From the Nautical Magazine.

The following are the particulars of experiments made on several kinds of wood, 1 1-2 inch square, and 2 feet long, placed vertically in the ground, and about 1 foot 6 inches exposed to the atmosphere, on the 1st of January, 1831; examined at two different times, viz., the 8th of May, 1833, and the 24th February, 1836:—

Species of Wood.	*Remarks, 8th May, 1833*	*Remarks, 24th February, 1836.*
English Oak	Much decayed and diminished in weight.	Very much decayed, especially those of open grain.
Italian Oak	Good, but decay had commenced on surface.	Do. do. rather less than the English.
Adriatic Oak	Very much decayed.	Very much decayed, excepting one piece, very good.
Leaf or Live Oak	Very good.	Three much decayed, the rest tolerable.
Canada White Oak	Very much decayed.	Very bad and rotten.
Memel do.	Ditto.	Ditto.
Dantzic do.	Ditto.	Exceeding bad.
Mahogany hard	Good.	Tolerably good.
Do soft	Much decayed.	Very bad, totally decayed.
Libanus Cedar	Good.	Tolerably good.
Pencil Cedar	Very good.	All very good, as when put in the ground.
African, No. 1	Very good.	A little decayed, and inclined to doat; better than English oak.
African, No. 2	Very good.	Worse than No. 1.
Teak, heavy	Very good.	Rather soft, but good.
Teak, light	Good.	Soft 1-4, but good.
Teak, part of Hasting's mizen-mast	Good.	Soft 1-4, the rest indifferent.
Fir, Dantzic	Much decayed.	Very much decayed, rotten all through.
Fir, Riga	Much decayed.	As bad as the Dantzic.
Fir, Memel	Much decayed.	Very bad, rotten.
Fir, Red Pine	Much decayed.	Very rotten, much like the Dantzic and Riga.
Fir, Yellow Pine	Very much decayed.	Very rotten.
Do. Virginia Pine	Decayed.	Very rotten.
Do. Pitch Pine, heavy	Decayed 1-2 of an inch, the rest good.	Decayed 1-8 of an inch, the rest tolerably good.
Do. do. light	Very rotten.	Very rotten.
Polish Larch	Decayed 1-4 in the surface, and lost in weight.	Decayed 1-4, the rest a little decayed.
Scotch do. Trenails	Surface 1-4 in, decayed and brittle.	Surface 1-4 in, decayed, the rest brittle.
English Elm	Very rotten.	All rotten.
Canada rock do.	Ditto.	Rotten.
Amercan ash	Ditto.	Ditto.
Locust Trenails	Good and retained their wt.	1-8 in, rotten, the rest as sound as when put in the ground.
Scotch Larch do.	Surface 1-4 decayed, and very brittle.	1-4 in, rotten, the rest brittle.
Stinkwood dark col	Surface not decayed, but very brittle.	This piece was misplaced.
Cowdie	Surface 1-4 decayed, and very brittle.	Rotten.
Stinkwood light co	Surface 1-8 dec., and brit.	Rotten.
Poonah.	Surface a little decayed, and become light.	Surface 1-8 decayed, the rest good, better than African.

Note.—Riga preferable to all the Fir, and Dantzic next.

*** Subscribers who desire to be supplied with missing numbers, will do well to apply for them soon. We shall always take pleasure in furnishing them if we have them to spare.

☞ Particular attention will be given to the procuring of all kinds of Instruments required by Engineers.—Orders must be accompanied with the necessary funds or city acceptances.

☞ Volume Six will be completed as speedily as possible. The next, or Volume for 1838, will be published in a more convenient form for preservation.

LOUISVILLE, CINCINNATTI, AND CHARLESTON RAILROAD.

NOTICE TO CONTRACTORS.—Sealed Proposals will be received at the Office of the Company in Columbia, S. C., until the 15th day of February next, for the graduation and masonry of that portion of the Road from Columbia to the crossing of the Congaree River, in the vicinity of McCord's Ferry, being 25 miles in extent.

Also, for the construction of a Bridge of 400 feet in length, on the Congaree River, to be built on stone piers and abutments, for which there are suitable quarries in the neighborhood.

The plans and profiles of the line will be ready for inspection at the Office of the Resident Engineer, in Columbia, S. C., after the 10th day of February.

So soon as the surveys for location, now in progress, are completed, that part of the Road extending from McCord's Ferry to the Charleston and Hamburg Railroad, at Branchville, will be put under contract, of which due notice will be given.

WM. GIBBS McNEILL,
Chief Engineer

☞ The Railroad Journal, N. Y. Courier & Enquirer, N. York; Providence Journal, Providence, R. I.; Atlas, Boston; Philadelphia Enquirer, Philadelphia; will publish the above notice 6 times, send a copy of the paper to the Office in Charleston, S. C., and a certified copy of their account for payment.

Jan. 12 fmw6

NEW ARRANGEMENT.

ROPES FOR INCLINED PLANES OF RAILROADS.

WE the subscribers have formed a co-partnership under the style and firm of Folger & Coleman, for the manufacturing and selling of Ropes for inclined planes of railroads, and for other uses, offer to supply ropes for inclined planes, of any length required without splice, at short notice, the manufacturing of cordage, heretofore carried on by S. S. Durfee & Co., will be done by the new firm, the same superintendent and machinery are employed by the new firm that were employed by S. S. Durfee & Co. All orders will be properly attended to, and ropes will be shipped to any port in the United States.

12th month 12th, 1836. Hudson, Columbia County, State of New-York.

ROBT. C. FOLGER.
33—tf GEORGE COLEMAN.

AMES' CELEBRATED SHOVELS, SPADES, &c.

300 dozens Ames' superior back-strap shovels.
150 do. do. do. plain do.
150 do. do. do. caststeel Shovels & Spades
150 do. do. Gold-mining Shovels
00 do. do. plated Spades.
50 do. do. socket Shovels and Spades

Together with Pick Axes, Churn Drills, and Crow Bars (steel pointed), manufactured from Salisbury refined iron—for sale by the manufacturing agents,

WITHERELL, AMES & CO.
No. 2 Liberty street, New-York.

BACKUS, AMES & CO.
No. 3 State-street, Albany.

N. B.—Also furnished to order, Shapes of every description, made from Salisbury refined Iron. v4-tf

MACHINE WORKS OF ROGERS, KETCHUM AND GROSVENOR, Paterson, New-Jersey.

The undersigned receive orders for the following articles, manufactured by them, of the most superior description in every particular. Their works being extensive, and the number of hands employed being large, they are enabled to execute both large and small orders with promptness and dispatch.

RAILROAD WORK.

Locomotive Steam-Engines and Tenders; Driving and other Locomotive Wheels, Axles Springs and Flange Tires; Car Wheels of cast iron, from a variety of patterns, and Chills; Car Wheels of cast iron, with wrought Tires; Axles of best American refined iron; Springs; Boxes and Bolts for Cars.

COTTON, WOOL, & FLAX MACHINERY,

Of all descriptions and of the most improved patterns, Style, and Workmanship.

Mill Geering and Millwright work generally; Hydraulic and other Presses; Press Screws; Calenders; Lathes and Tools of all kinds; Iron and Brass Castings of all descriptions.

ROGERS, KETCHUM & GROSVENOR,
Paterson, N. J. or 60 Wall-st. New-York
51tf

FRAME BRIDGES.

THE undersigned, General Agent of Col. S. H. LONG, to build Bridges, or vend the right to others to build on his Patent Plan, would respectfully inform Railroad and Bridge Corporations, that he is prepared to make contracts to build, and furnish all materials for superstructures of the kind, in any part of the United States, (Maryland excepted.)

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington; two miles from the former place. Across the Motawamkeag river on the Military road in Maine. On the national road in Illinois, at sundry paints. On the Baltimore and Susquehanna Railroad at three points. On the Hudson and Paterson Railroad in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contoocook river at Hennikar, N. H. Across the Souhegan river, at Milford, N. H. Across the Connecticut river, at Hancock, N. H. Across the Androscoggin river, at Turner Centre, Maine. Across the Kennebec river, at Waterville, Maine. Across the Genesee river, at Squakiehill, Mount Morris, N. Y. Across the White River, at Hartford, Vt. Across the Connecticut River at Lebanon, N. H. Across the mouth of the Broken Straw Creek, Penn. Across the mouth of the Cataraugus Creek, N. Y. A Railroad Bridge diagonally across the Erie Canal, in the City of Rochester, N. Y. A Railroad Bridge at Upper Still Water, Orono, Maine. This Bridge is 500 feet in length; one of the spans is over 200 feet. It is probably the *firmest wooden bridge* ever built in America.

Notwithstanding his preseet engagements to build between twenty and thirty Railroad Bridges, and several common bridges, several of which are now in progress of construction, the subscriber will promptly attend to business of the kind to much greater extent and on liberal terms.

MOSES LONG,
Rochester, Jan. 19th, 1837. 4—y

STEPHENSON,

Builder of a superior style of Passenger Cars for Railroads,

No. 264 Elizabeth street, near Bleecker street,
NEW-YORK.

RAILROAD COMPANIES would do well to examine these Cars; a specimen of which may be seen on the New-York and Harlaem Railroad, now in operation.

ROACH & WARNER,

Manufacturers of OPTICAL, MATHEMATICAL AND PHILOSOPHICAL INSTRUMENTS, 293 Broadway, New-York, will keep constantly on hand a large and general assortment of Instruments in their line.

Wholesale Dealers and Country Merchants supplied with SURVEYING COMPASSES, BAROMETERS, THERMOMETERS, &c. &c. of their own manufacture, warranted accurate, and at lower prices than can be had at any other establishment.

☞ Istruments made to order and repaired.
1y—14

RAILWAY IRON, LOCOMOTIVES, &c. &c.

THE subscribers offer the following articles for sale:—

Railway Iron, flat bars, with countersunk holes and mitred joints,											lbs
350 tons	2	by	1,	15	ft	in	length,	weighing	4	00	per ft
280 "	2	"	½,	"		"	"		3	00	"
70 "	1½	"	½,	"		"	"		2½		"
80 "	1½	"	¼,	"		"	"		1	00	"
90 "	1	"	¼,	"		"	"		¾		"

with Spikes and Splicing Plates adapted thereto. To be sold free of duty to State governments, or incorporated companies.

Orders for Pennsylvania Boiler Iron executed.

Rail Road Car and Locomotive Engine Tires, wrought and turned or unturned, ready to be fitted on the wheels, viz. 30, 33, 36, 42, 44, 54, and 60 inches diameter.

E. V. Patent Chain Cable Bolts for Railway Car axles, in lengths of 12 feet 6 inches, to 13 feet 2½, 2⅝, 3, 3⅛, 3¼, 3½, and 3⅝ inches diameter.

Chains for Inclined Planes, short and stay links, manufactured from the E. V. Cable Bolts, and proved at the greatest strain.

India Rubber Rope for Inclined Planes, made from New Zealand Wax.

Also, Patent Hemp Cordage for Inclined Planes, and Canal Towing Lines.

Patent Felt for placing between the iron chair and stone block of Edge Railways.

Every description of Railway Iron, as well as Locomotive Engines, imported at the shortest notice, by the agency of one of our partners, who resides in England for this purpose.

A highly respectable American Engineer resides in England for the purpose of inspecting all Locomotives, Machinery, Railway Iron, &c. ordered through us.

A. & G. RALSTEN & CO.,
28 tf Philadelphia, No. 4 South Front-st.

ARCHIMEDES WORKS.

(100 North Moore-street, N.Y.)

THE undersigned beg leave to inform the proprietors of Rail Roads, that they are prepared to furnish all kinds of Machinery for Rail Roads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Rail Road, none of which have failed.—Castings of all kinds, Wheels, Axles and Boxes, furnished at the shortest notice.

H. R. DUNHAM & CO.
NEW YORK, February 12th, 1836. 4—ytf

PATENT RAILROAD, SHIP AND BOAT SPIKES.

⁂ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent) are found superior to any yet ever offered in market.

Railroad companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above-named factory—for which purpose they are found invaluable, as their adhesion is more than double any common Spikes made by the hammer.

⁂ All orders directed to the Agent, Troy, N.Y. will be punctually attended to.

HENRY BURDEN, Agent.
Troy, N.Y., July, 1831.

⁂ Spikes are kept for sale, at factory prices, by I & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water-street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

G. Mitchell, Printer, 265 Bowery, N.Y.